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**STATEMENT ON THE NATION'S REPORT CARD:  
*NAEP 2009 Science—Grades 4, 8, and 12***

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The Report Card released this morning establishes a significant marker for educators and the public as we consider the place and importance of science in American education today. That is true in terms of the “what” of science education, and also of “how” and “where” this education takes place, which has been addressed by Alan Friedman and Bruce Alberts. In addition, we need to pay close attention to who has the opportunity to receive a first-rate science education and in what context.

The 2009 Science assessment is based on a new framework, adopted by the National Assessment Governing Board. Conceptually, this assessment is different from the ways NAEP has tested science before. As in the past, this assessment does measure what American students know about three main fields of science. You can see from the released questions and the descriptions of achievement levels, a considerable amount of scientific knowledge is required for students to do well on the exam.

However, the new NAEP assessment goes well beyond *knowing* to *doing*. It asks students to apply scientific principles, understandings, and methodologies in order to solve real-world problems and design scientific experiments. Overall, students found the science assessment to be a difficult exam. They did much better on the multiple-choice items than on constructed response, and at 12<sup>th</sup> grade the average percent correct for constructed response was just 27 percent.

There are no trends because the NAEP science assessment has changed. The new framework and questions reflect current research and the best practices in science education. The released questions and the NAEP achievement levels give a quite nuanced picture of the areas where student achievement is strong and where performance is lagging.

The report shows a fair level of basic scientific literacy—particularly, of everyday scientific information in the elementary grades. However, when information has to be consistently applied, which is the core of the *Proficient* achievement level, performance is more spotty. Only about a third can reach this level in fourth grade, and as expectations ratchet upward in grades

8 and 12, the proportion of students reaching *Proficient* declines to just slightly over a fifth at twelfth grade.

The proportion of students who can design their own investigations, consider alternatives, and perceptively critique other experimental designs is very, very small—just the 1 to 2 percent that reach the Advanced achievement level.

The results also allow us to compare the overall performance of different demographic groups of students; of those in different types of schools—public and private, and public charter schools; and of public school students in almost all of the states. For better or worse, nearly all of these patterns are pretty much the same as what NAEP has reported in other subjects and, in most cases, for quite a few years. The groups and jurisdictions that have done well in reading and mathematics also generally do well in science too. Unfortunately, the converse is also true. The groups performing lower in reading and math also perform lower in science.

The one significant exception is the difference in achievement between male and female students. The boys score slightly higher in science at all three grades tested—4, 8, and 12, and the difference gets slightly wider as students progress through school. Male students are also slightly ahead in math. But in reading female students are ahead by somewhat larger margins.

In the comparison of jurisdictions the one that stands out as particularly high is the Department of Defense dependents' schools in eighth grade science. It ties with North Dakota and Montana as the highest-scoring in the nation, quite a bit higher than its ranking in math. Also, the black and Hispanic students in Defense Department schools are particularly strong.

In the two grades, 4 and 8, where samples are satisfactory, students in private schools and those in Catholic schools specifically have higher average scores than public school students. The black and Hispanic students in these schools do particularly well compared to their public school counterparts. White students are also ahead, but by much less than the other groups at eighth grade.

As Commissioner Buckley has told you, the NAEP release today not only includes the results in the Nation's Report Card, but also a vast amount of additional, very detailed data that is available on-line through the NAEP Data Explorer. This includes background information on the science courses that students take, their attendance and homework, and demographic characteristics.

NAEP, as you know, is a survey at one particular point in time. It does not follow comparable groups of students who have different experiences. Therefore, it should not be used to prove cause-and-effect relationships. However, NAEP can show associations—the factors that, for whatever reasons, are associated with higher or lower achievement. The profiles it draws can show the characteristics of higher-scoring and lower-scoring groups of students.

We had some help from NCES and the staff at Educational Testing Service, and put together profiles of the 12th graders who scored at or above *Proficient*, the top 21 percent of the class, and the lowest-achieving 40 percent who scored below *Basic*.

And the contrasts between the two groups are quite striking.

Among 12th graders nationwide, 63 percent of the students at or above *Proficient* have taken biology, chemistry, and physics, compared to just 19 percent that took all three courses among

the students who score below *Basic*. Some 46 percent of Proficient 12th graders took an Advanced Placement science course, compared to 11 percent of those below *Basic*. Seventy-seven percent are in a college prep academic program, compared to just 39 percent. Eighty-five percent say they like science, compared to 51 percent. Forty-eight percent read at least 16 pages a night for homework, compared to just 21 percent of the low-scoring students who report reading that much.

The demographic differences are also substantial. Among the 12th grade students reaching *Proficient*, 78 percent are white and 11 percent are Asian/Pacific Islander. Just 10 percent are black or Hispanic. Of the 12th graders below *Basic*, 27 percent are black and 25 percent Hispanic or slightly more than half. Males comprise 58 percent of those at or above *Proficient*, and just 46 percent of those below *Basic*.

Students from families poor enough to qualify for a subsidized school lunch account for 42 percent of the 12th graders below *Basic*, but just 11 percent of those at or above Proficient. Students with no parent going beyond high school make up 37 percent of the 12th graders that score below Basic, but just 11 percent of those reaching Proficient.

These differences are cause for serious concern. They show that a great deal more must be done to raise the science achievement of poor and minority students in high school so that substantial numbers from these groups can participate in the work and rewards of scientific careers. Also, more should be done to improve the science achievement of girls.

Indeed, all students graduating from high school need a strong understanding of the natural world in which they live and of the scientific principles undergirding modern society.

The nation needs more scientists who can discover new knowledge and strengthen our economy. It needs an even larger number of science-literate citizens who can understand the many public issues in which science is involved—from global climate change to genetically-modified crops to childhood immunizations.

Without a strong science education for all students, the long-term health of the nation's economy and of its politics is at risk. The new NAEP Science Report Card indicates that despite considerable efforts, there are still considerable deficiencies in the level of science achievement that most of our students have attained.